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COMPARISON OF IN SITU MEASUREMENTS AND MODEL FORECASTS OF PRECIPITATION OVER THE BALTIC SEA

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Numerical weather forecast models are becoming more and more important for the determination of mesoscale precipitation fields. Due to possible differences in precipitation over land and sea it is necessary not only to compare the model results to land based in situ measurements but to extend these intercomparisons to the sea. This is being done with aid of precipitation measurements at large ferry ships sailing between Germany and Finland. In order to overcome the problems associated with rainfall measurements at moving ships special ship rain gauges are used.
Intercomparisons have been performed using precipitation forecasts given by three numerical models. The corresponding data sets have been created using different modes of operation and horizontal resolutions:

model	operated at	mode	resolution
Europamodell	DWD[1], Offenbach	operational	1/2 deg.
REMO	MPI[2], Hamburg	climate	1/6 deg.
REMO	GKSS[3], Geesthacht	operational	1/6 deg.

These studies are focussed at the PIDCAP period (August to November, 1995). The technique applied for the comparisons with the in situ measurements was to interpolate the simulated precipitation to the respective ship's locations and to calculate the total precipitation for both the model results and the measurements as a function of model longitude. The fact that all the three models use the same rotated coordinates makes it easier to compare the individual results.

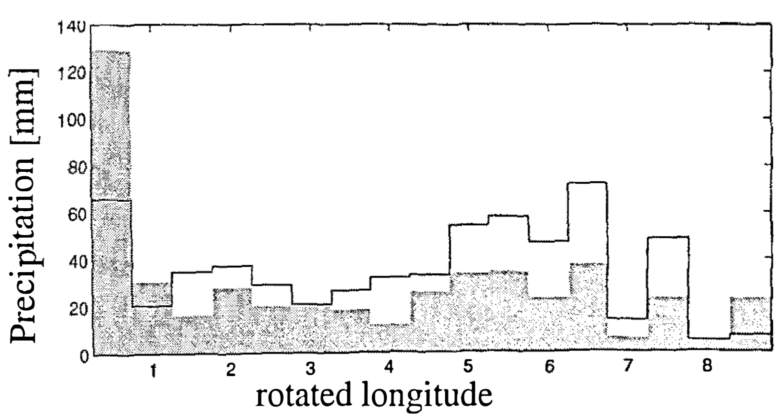

Figure 1: *Cumulated precipitation along the ship's track. The abszissa ranges from Kiel in the West to Kotka (SE Finland) in the East. Measurements (shaded columns) and 'Europamodell' forecasts (solid line) are shown for the period Aug. 13th to Oct. 31st 1995.*

Although all three models have the same basic model physics implemented distinct differences in the simulation of precipitation are obvious. However, one should keep in mind that it is not feasible to intercompare the results of two models having different horizontal resolutions, because the individual grid boxes do not represent the same area.

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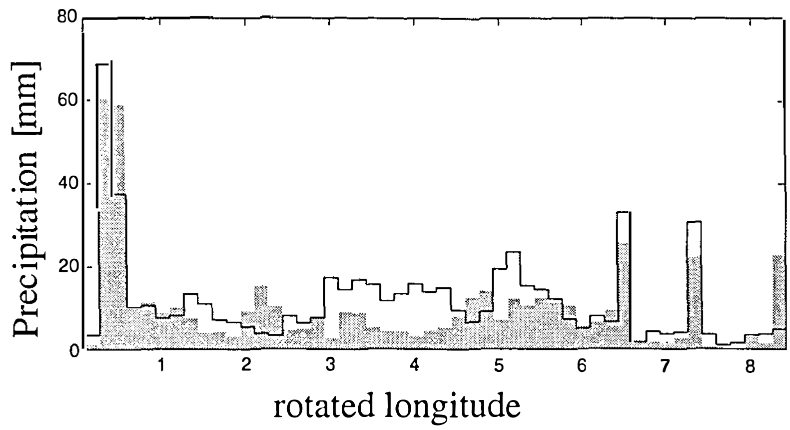

Figure 2: *Cumulated precipitation along the ship's track. The abszissa ranges from Kiel in the West to Kotka (SE Finland) in the East. Measurements (shaded columns) and MPI–REMO forecasts (solid line) are shown for the period Aug. 13th to Oct. 31st 1995.*

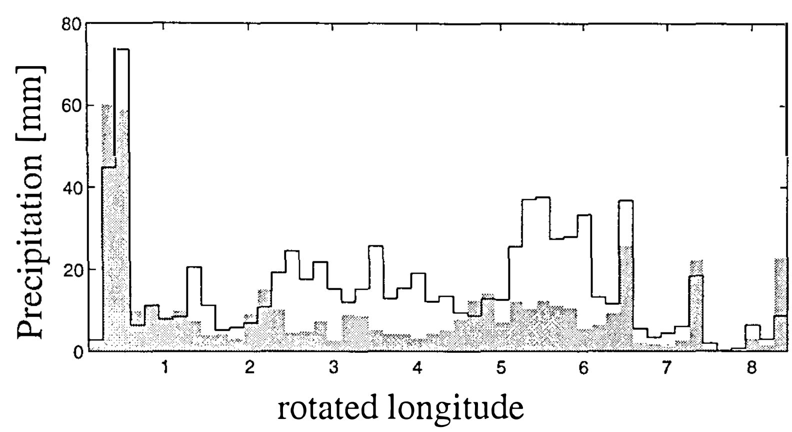

Figure 3: *Cumulated precipitation along the ship's track. The abszissa ranges from Kiel in the West to Kotka (SE Finland) in the East. Measurements (shaded columns) and GKSS–REMO forecasts (solid line) are shown for the period Aug. 13th to Oct. 31st 1995.*

With regard to the facts that the ships are non stationary and that rainfall probability is rather small, this late summer/early fall restricted studies can be characterized as spot checks of model forecasts. Hence we extended this investigation to the years 1996 and 1997. For this period of time only the data from the operational 'Europamodell' were available. It shows that the relation between measured and simulated precipitation varies quite strongly throughout the considered years. A general overestimation of modelled precipitation could not be found. Not only to strengthen the validity of studies like this it is sensible to enhance the resolution of the 'Europamodell' in the future.

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